EPD®

THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM EPD EN 15804 VERIFIED

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

Rigitone® Activ'Air®
8-15-20
12.5 mm

Date of issue: 2021-04-26
Validity: 5 years
Valid until: 2026-04-26
Version: 1
Scope of the EPD®: Europe

EPD VERIFIED

The environmental impacts of this product have been assessed over its whole life cycle. Its Environmental Product Declaration has been verified by an independent third party.

Registration number
The International EPD® System:
S-P-03547

Placo SAINT-GOBAIN

General information

Manufacturer: Saint-Gobain Placoplatre, Tour Saint-Gobain 12, place de l'Iris, 92400 Courbevoie
Programme used: International EPD System **http://www.environdec.com/**
EPD registration number/declaration number: S-P-03547
PCR identification: EN 15804 Sustainability of construction works – Environmental product declaration - core rules for the product category of construction product and The International EPD® System PCR 2012:01 version 2.33 for Construction products and Construction services.
Site of manufacture: Chambéry for Saint-Gobain Placoplatre.
Owner of the declaration: Saint-Gobain Placoplatre
Product / product family name and manufacturer represented: Rigitone® Activ'Air® 8-15-20 12.5 mm produced by Saint-Gobain Placoplatre France at Chambéry
UN CPC code: 37530 Articles of plaster or of composition based on plaster
Declaration issued: 2021-04-26
Valid until: 2026-04-26
Demonstration of verification: an independent verification of the declaration was made, according to ISO 14025:2010. This verification was external and conducted by the following third party: Yannick Le Guern (ELYS Conseil), based on the PCR mentioned above.
EPD Prepared by: Sandrine Jacquet and Valentin Rousseau, Saint-Gobain Placoplatre.
Contact: Sandrine Jacquet Sandrine.jacquet@saint-gobain.com

The Declared Unit is 1 m² of installed Rigitone® Activ'Air® 8-15-20 12.5 mm for an expected average service life of 50 years.

Declaration of Hazardous substances: (Candidate list of Substances of Very High Concern): none

Environmental management systems in place: **ISO 14001:2015**
Health and safety management systems in place: **/**
Quality management systems in place: **/**
Energy management systems in place: **ISO 50001:2018**
Geographical scope of the EPD®: Europe

CEN standard EN 15804 serves as the core PCR[a]	
PCR:	PCR 2012:01 Construction products and Construction services, Version 2.2
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com
Independent verification of the declaration, according to EN ISO 14025:2010 **Internal ☐ External ☒**	
Third party verifier:	Yannick Le Guern (ELYS Conseil)
Procedure for follow-up of data during EPD validity involves third party verifier	Not concerned
Accredited or approved by	The International EPD System

“The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.”

Product description

Product description and use:
This Environmental Product Declaration (EPD®) describes the environmental impacts of 1 m² installed Rigitone® Activ'Air® 8-15-20 12.5 mm and an expected average service life of 50 years.

Rigitone® Activ'Air® ceiling is made up of a gypsum core from natural gypsum with additives and paper liner. The content of external recycled material is 8,0 %. The product is based on 12,5 mm specialized gypsum board suitable for most interior building applications where aesthetics and sound insulation are specified.

Technical data/physical characteristics:

EN CLASSIFICATION	EN 14190
REACTION TO FIRE	Euroclass A2-s1, d0
ACOUSTIC PROPERTY	αw = 0.75 (L)
PERFORATION	6%, round and alternate
EXTERNAL RECYCLING GYPSUM	8,0 %

Description of the main components and/or materials for 1 m2 of product for the calculation of the EPD®:

PARAMETER	VALUE
Quantity of board for 1 m² of product	9.9 kg
Thickness	12.5 mm
Surfacing	Paper liner: 322 g/m² Acoustic tissue: 47 g/m² Glue: 33 g/m²
Packaging for the transportation and distribution	0.93 kg of Placoplatre® BA 13 0.458 kg of wooden pallet 0.009 kg of polyethylene film 0.0047 kg of steel corners 0.0012 kg of PET strap 0.00035 kg of cardboard corners
Product used for the Installation	Jointing compound: 330 g/m² Water for jointing: 0.165 l/m² Screws: 8 pc/m² (1.25 g per screw)

During the life cycle of the product any hazardous substance listed in the “Candidate List of Substances of Very High Concern (SVHC) for authorization” has not been used in a percentage higher than 0,1% of the weight of the product.

LCA calculation information

EPD TYPE DECLARED	Cradle to Gate with options Product-specific (one product, one manufacturing site)
DECLARED UNIT	1 m² of installed board with a weight of 9.9 kg/m²
SYSTEM BOUNDARIES	Cradle to Gate with options: stages A1 – 3, A4 – A5, B1 – 7, C1 – 4
REFERENCE SERVICE LIFE (RSL)	50 years
CUT-OFF RULES	Life Cycle Inventory data for a minimum of 99% of total inflows to the upstream and core module shall be included
ALLOCATIONS	Production data. Recycling, energy and waste data have been calculated on a mass basis
GEOGRAPHICAL COVERAGE AND TIME PERIOD	Scope includes: France Data is collected from one production site at Chambéry for Saint-Gobain Placoplatre. Data collected for the year 2019. Background data: Ecoinvent V3.5 (2018) and GaBi (Version 9.2.0.58)
PRODUCT CPC CODE	37530 Articles of plaster or of composition based on plaster

According to EN 15804, EPDs of construction products may not be comparable if they do not comply with this standard. According to ISO 21930, EPDs might not be comparable if they are from different programmes.

Life cycle stages

Flow diagram of the Life Cycle

Product stage, A1-A3

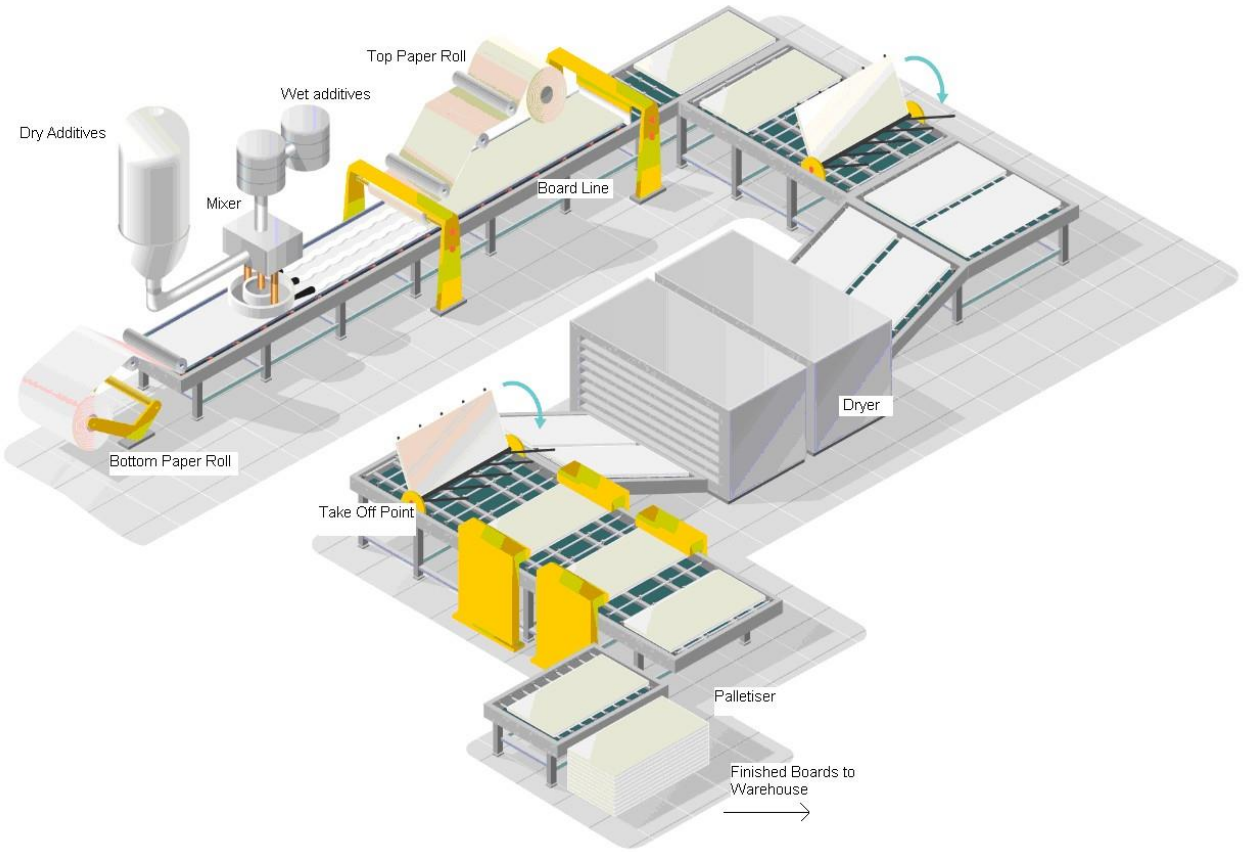
Description of the stage: the product stage of plaster products is subdivided into 3 modules A1, A2 and A3 respectively “Raw material supply”, “transport to manufacturer” and “manufacturing”.

A1, raw material supply.
This includes the extraction and processing of all raw materials and energy which occur upstream from the manufacturing process.

A2, transport to the manufacturer.
The raw materials are transported to the manufacturing site. The modelling includes road, boat and/or train transportations of each raw material.

A3, manufacturing.
This module includes the manufacture of products and the manufacture of packaging. The production of packaging material is taken into account at this stage. The processing of any waste arising from this stage is also included.

Manufacturing process flow diagram



Manufacturing in detail:
The initial materials are homogenously mixed to form a gypsum slurry that is spread via multiple hose outlets onto a paper liner on a moving conveyor belt. A second paper liner is fed onto the production line from above to form the plasterboard. The plasterboard continues along the production line where it is finished, dried, and cut to size.

Construction process stage, A4-A5

Description of the stage: the construction process is divided into 2 modules: A4, transport to the building site and A5, installation in the building

A4, transport to the building site.
This module includes transport from the production gate to the building site (Representative as average for the European market).

Transport is calculated on the basis of a scenario with the parameters described in the following table.

PARAMETER	VALUE (expressed per functional/declared unit)
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	Truck, maximum load weight of 24t and consumption of 0.38 liters per km
Distance	Truck: 1 500 km
Capacity utilisation (including empty returns)	100% for truck 30% empty return
Bulk density of transported products	48 m^2 for one pallet and 20 pallets in truck
Volume capacity utilisation factor	<1

A5, installation into the building.
The accompanying table quantifies the parameters for installing the product at the building site. All installation materials and their waste processing are included.

PARAMETER	VALUE (expressed per functional/declared unit)
Ancillary materials for installation (specified by materials)	Jointing compound: 330 g/m². Screws: 8pc /m²
Other resource use	Water for jointing : 0.165 l/m^2
Quantitative description of energy type (regional mix) and consumption during the installation process	0.008 kWh (electrical energy, according to the French mix, to screw the plates)
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	5% of plaster ceiling 5% of ancillary materials for installation 0.93 kg of plasterboard (packaging) 0.458 kg of wooden pallet (packaging) 0.009 kg of PE (packaging) 0.0047 kg of steel corners (packaging) 0.0012 kg of PET strap (packaging) 0.00035 kg of cardboard corners (packaging)
Output materials (specified by type) as results of waste processing at the building site e.g. of collection for recycling, for energy recovering, disposal (specified by route)	Plaster ceiling and all ancillary materials are 100% landfilled. The packaging wastes are mainly collected and recycled for polyethylene and PET of the palletized load (78.9%), wood of pallet and cardboard (57%). They are incinerated (55.6%) and landfilled (44.4%) for the rest. The plasterboard and the steel corners are totally landfilled.
Direct emissions to ambient air, soil and water	None

Use stage (excluding potential savings), B1-B7

Description of the stage:
The use stage, related to the building fabric includes:

B1, use or application of the installed product;
B2, maintenance;
B3, repair;
B4, replacement;
B5, refurbishment;
B6, operational energy use
B7, operational water use

Description of scenarios and additional technical information:
The product has a reference service life of 50 years. This assumes that the product will last in situ with no requirements for maintenance, repair, replacement or refurbishment throughout this period. Therefore it has no impact at this stage.

Maintenance:

PARAMETER	VALUE (expressed per functional/declared unit)
Maintenance process	None required during product lifetime
Maintenance cycle	None required during product lifetime
Ancillary materials for maintenance (e.g. cleaning agent, specify materials)	None required during product lifetime
Wastage material during maintenance (specify materials)	None required during product lifetime
Net fresh water consumption during maintenance	None required during product lifetime
Energy input during maintenance (e.g. vacuum cleaning), energy carrier type, (e.g. electricity) and amount, if applicable and relevant	None required during product lifetime

Repair:

PARAMETER	VALUE (expressed per functional/declared unit)
Repair process	None required during product lifetime
Inspection process	None required during product lifetime
Repair cycle	None required during product lifetime
Ancillary materials (e.g. lubricant, specify materials)	None required during product lifetime
Wastage material during repair (specify materials)	None required during product lifetime
Net fresh water consumption during repair	None required during product lifetime
Energy input during repair (e.g. crane activity), energy carrier type, (e.g. electricity) and amount if applicable and relevant	None required during product lifetime

Replacement:

PARAMETER	VALUE (expressed per functional/declared unit)
Replacement cycle	None required during product lifetime
Energy input during replacement (e.g. crane activity), energy carrier type, (e.g. electricity) and amount if applicable and relevant	None required during product lifetime
Exchange of worn parts during the product's life cycle (e.g. zinc galvanized steel sheet), specify materials	None required during product lifetime

Refurbishment:

PARAMETER	VALUE (expressed per functional/declared unit)
Refurbishment process	None required during product lifetime
Refurbishment cycle	None required during product lifetime
Material input for refurbishment (e.g. bricks), including ancillary materials for the refurbishment process (e.g. lubricant, specify materials)	None required during product lifetime
Wastage material during refurbishment (specify materials)	None required during product lifetime
Energy input during refurbishment (e.g. crane activity), energy carrier type, (e.g. electricity) and amount	None required during product lifetime
Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants)	None required during product lifetime

Use of energy and water:

PARAMETER	VALUE (expressed per functional/declared unit)
Ancillary materials specified by material	None required during product lifetime
Net fresh water consumption	None required during product lifetime
Type of energy carrier (e.g. electricity, natural gas, district heating)	None required during product lifetime
Power output of equipment	None required during product lifetime
Characteristic performance (e.g. energy efficiency, emissions, variation of performance with capacity utilisation etc.)	None required during product lifetime
Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants)	None required during product lifetime

End-of-life stage C1-C4

Description of the stage: This stage includes the next modules:

C1, de-construction, demolition;
C2, transport to waste processing;
C3, waste processing for reuse, recovery and/or recycling;
C4, disposal, including provision and all transport, provision of all materials, products and related energy and water use.

Description of the scenarios and additional technical information for the end-of-life:

PARAMETER	VALUE (expressed per functional/declared unit)
Collection process specified by type	10,3 kg collected with mixed construction wastes
Recovery system specified by type	0 % recycled
Disposal specified by type	100 % landfilled
Assumptions for scenario development (e.g. transportation)	On average gypsum waste is transported 50km by truck to the landfill facility

Reuse/recovery/recycling potential, D

Description of the stage: Impact and benefits are not considered for recycled plaster fractions.

LCA results

Description of the system boundary (X = Included in LCA, MNA = Module Not Assessed)

CML 2001 has been used as the impact model. Specific data has been supplied by the plant, and generic data come from GaBi and Ecoinvent databases.
All emissions to air, water, and soil, and all materials and energy used have been included.

All figures refer to a declared unit of 1 m² of installed building ceiling plasterboard of 9.9 kg/m² and an expected average service life of 50 years.

PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-recovery
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MNA

ENVIRONMENTAL IMPACTS

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Global Warming Potential (GWP 100) - *kg CO_2 equiv/FU*	2,50	1,67E+00	3,46E-01	0	0	0	0	0	0	0	0	4,29E-02	0,00E+00	4,46E-01	MNA
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.														
Ozone Depletion (ODP) *kg CFC 11 equiv/FU*	1,13E-07	3,04E-07	4,18E-08	0	0	0	0	0	0	0	0	7,81E-09	0,00E+00	2,00E-08	MNA
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
Acidification potential (AP) *kg SO_2 equiv/FU*	5,29E-03	4,44E-03	1,31E-03	0	0	0	0	0	0	0	0	1,14E-04	0,00E+00	4,74E-04	MNA
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl, buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.														
Eutrophication potential (EP) *kg $(PO_4)^{3-}$ equiv/FU*	1,90E-03	1,16E-03	3,42E-04	0	0	0	0	0	0	0	0	2,99E-05	0,00E+00	3,86E-04	MNA
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
Photochemical ozone creation (POPC) *kg Ethylene equiv/FU*	4,61E-04	2,74E-04	5,76E-05	0	0	0	0	0	0	0	0	7,04E-06	0,00E+00	1,40E-04	MNA
	Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
Abiotic depletion potential for non-fossil ressources (ADP-elements) - *kg Sb equiv/FU*	3,89E-04	2,09E-07	2,05E-05	0	0	0	0	0	0	0	0	5,38E-09	0,00E+00	7,08E-08	MNA
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU*	41,8	23,30	5,11	0	0	0	0	0	0	0	0	6,00E-01	0,00E+00	1,68	MNA
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														

RESOURCE USE

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials *MJ/FU*	25,0	9,24E-02	1,60	0	0	0	0	0	0	0	0	2,38E-03	0,00E+00	2,52E-02	MNA
Use of renewable primary energy used as raw materials *MJ/FU*	14,9	0	-3,79	0	0	0	0	0	0	0	0	0	0,00E+00	0	MNA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	39,9	9,24E-02	-2,19	0	0	0	0	0	0	0	0	2,38E-03	0,00E+00	2,52E-02	MNA
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU*	48,8	23,50	5,66	0	0	0	0	0	0	0	0	6,04E-01	0,00E+00	1,72	MNA
Use of non-renewable primary energy used as raw materials *MJ/FU*	1,35	0	-1,88E-02	0	0	0	0	0	0	0	0	0	0	0	MNA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - *MJ/FU*	50,1	23,50	5,64	0	0	0	0	0	0	0	0	6,04E-01	0,00E+00	1,72	MNA
Use of secondary material *kg/FU*	8,22E-01	0	4,18E-02	0	0	0	0	0	0	0	0	0	0	0	MNA
Use of renewable secondary fuels- *MJ/FU*	2,17E-02	0	1,09E-03	0	0	0	0	0	0	0	0	0	0	0	MNA
Use of non-renewable secondary fuels - *MJ/FU*	1,14E-01	0	5,71E-03	0	0	0	0	0	0	0	0	0	0	0	MNA
Use of net fresh water - m^3/FU	2,01E-02	2,72E-03	2,08E-03	0	0	0	0	0	0	0	0	7,01E-05	0,00E+00	1,81E-03	MNA

WASTE CATEGORIES

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Hazardous waste disposed *kg/FU*	5,67E-03	6,85E-06	1,17E-03	0	0	0	0	0	0	0	0	1,76E-07	0,00E+00	1,13E-06	MNA
Non-hazardous (excluding inert) waste disposed *kg/FU*	2,85E-01	4,18E-02	1,73	0	0	0	0	0	0	0	0	1,08E-03	0,00E+00	10,30	MNA
Radioactive waste disposed *kg/FU*	8,37E-05	1,71E-04	2,09E-05	0	0	0	0	0	0	0	0	4,40E-06	0,00E+00	1,15E-05	MNA

OUTPUT FLOWS

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Components for re-use *kg/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Materials for recycling *kg/FU*	4,88E-02	0	2,77E-01	0	0	0	0	0	0	0	0	0	0,00E+00	0	MNA
Materials for energy recovery *kg/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Exported energy, detailed by energy carrier *MJ/FU*	0	0	5,69E-05	0	0	0	0	0	0	0	0	0	0	0	MNA

LCA results interpretation

The following figure refers to a functional unit of 1 m² of installed building plasterboard with a weight total of 9.9 kg/m² and for specific application of interior building for an expected average service life of 50 years.

Environmental impacts / Stages	Product (A1-A3)	Transport and Installation (A4-A5)	Use (B1-B7)	End-of-life (C1-C4)	Total life cycle *Environmental impacts of the product*	Recycling Positive benefits of recycling (D)
Global warming	2,5	2,0	0	4,9E-01	5,0 kg CO_2 equiv /UF	0
Abiotic depletion potential for fossil resources	42	28,4	0	2,3	73 MJ/UF	0
Energy consumption [1]	90	27,0	0	2,4	119 MJ/UF	0
Water consumption	2,0E-02	4,8E-03	0	1,9E-03	2,7E-02 m^3/UF	0
Waste production [2]	0,3	1,7	0	10,3	12 kg/UF	0

[1] Addition of : "Total use of renewable primary energy resources " + "Total use of non-renewable primary energy resources ".
[2] Addition of : "Hazardous waste disposed" + "Non-hazardous waste disposed" + "Radioactive waste disposed".

Global Warming Potential (Climate Change) (GWP)
When analyzing the above figure for GWP, it can be seen that the first contributor to this environmental impact is from the production modules (A1 – A3). This is primarily because the sources of greenhouse gas emissions are predominant in this part of the life cycle. CO_2 is released on site by the combustion of natural gas. Combustion of fuel in transport vehicles will generate the second highest percentage of greenhouse gas emissions. We can see that end of the life stage also contribute to the GWP; however, the production and transport + installation stages contribute to over 90% of the impact.

Abiotic depletion potential for fossil resources and Energy consumption
A similar trend is seen for the abiotic depletion potential for fossil resources and the use of primary energy. Indeed, the consumption of natural gas and fuel have high impacts on these indicators.

Water Consumption
Water is used within the manufacturing facility and therefore we see the highest contribution in the production phase. The second highest contribution occurs in the installation site due to the water used on the joint components.

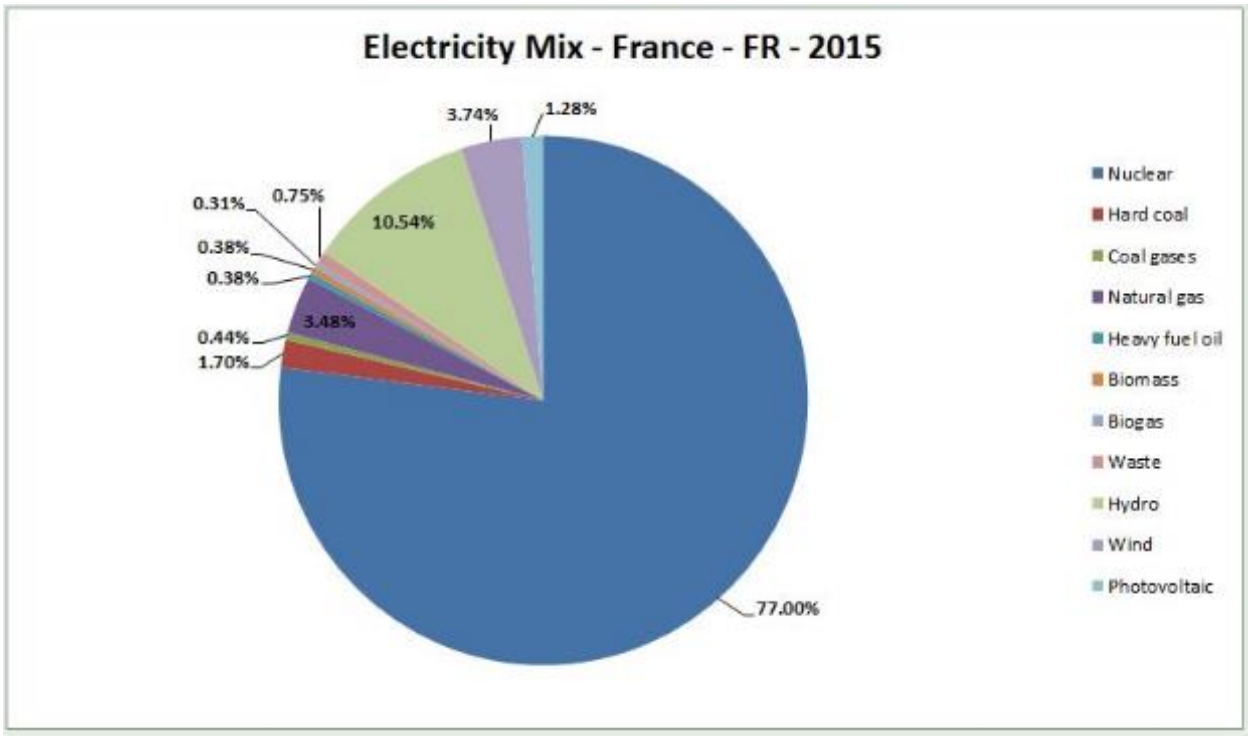
Waste Production

Waste production does not follow the same trend as the above environmental impacts. The largest contributor is the end of life module. This is because 100% of the product is assumed to be sent to landfill at end of life. The very small impact associated with installation is due to the loss rate of product during implementation.

Additional information

Electricity description

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of average production in France
Geographical representativeness description	**Split of energy sources in France**
Reference year	2015
Type of data set	Cradle to gate from Thinkstep
Source	GaBi database from International Energy Agency -2015
Global Warming Potential	0,0638 kg eq CO_2/kWh



Inside air quality

Samples of plasterboard ceilings have been characterized regarding VOC and formaldehyde emissions in chamber emission test following NF (EN) ISO 16000-3-6-9 and 11 norms. The results show that the plasterboard ceilings analyzed comply with the AFSSETT 2009 protocol.

The French health classification of the Rigitone®Activ'® 8-15-20 product is A+ according to the French decree of April 2011 19th regarding the heath labeling of construction products, wall or floor coverings, paints and varnishes, on their volatile pollutants.

The measurement report attesting to this classification is the report from Bureau Veritas N°C C-020819-08683-006 of 2019 established for a product of the same family.

References

1. EPD International (2017) General Programme Instructions for the International EPD® System. Version 3.0, dated 2017-12-11. www.environdec.com.
2. The International EPD System PCR 2012:01 Construction products and Construction services, Version 2.33
3. EN 15804:2012 + A1:2013 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
4. ISO 21930:2007 Sustainability in building construction – Environmental declaration of building products
5. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures
6. ISO 14040:2006 Environmental management. Life cycle assessment. Principles and framework
7. ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines
8. Saint-Gobain Environmental Product Declaration Methodological Guide for Construction Products, Version 3.0.1 (2013)
9. European Chemical Agency, Candidate List of substances of very high concern for Authorisation. http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp